IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D0EB-D

PRODUCT NAME: RANDOM TAD TEST

DATE CREATED: JUNE 7,1971

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: MICHAEL DAVIS

1.   ABSTRACT

      THIS PROGRAM TESTS THE TAD INSTRUCTING OF THE PDP-8E, THE
      TAD INSTRUCTION, INSTRUCTION ADDRESS, OPERAND ADDRESS AND
      BOTH OPERANDS ARE PRODUCED BY RANDOM NUMBER GENERATORS.

2.   REQUIREMENTS

2.1   EQUIPMENT

      PDP-8E EQUIPPED WITH AT LEAST 4K OF MEMORY;

      TELETYPE.

2.2   STORAGE

      THE PROGRAM IS LOADED INTO LOCATIONS 6600 THRU 7577.
      THE TEST AREA IS 0000-6577. TEMPORARY STORAGE LOCATIONS
      ARE LOCATED ON PAGE 0.

2.3   PRELIMINARY PROGRAMS

      MAINDEC-8E-D8AA, D8BA, D8CA, D8DA

3.   LOADING PROCEDURE

      THE STANDARD PROCEDURE FOR LOADING BINARY TAPES IS TO BE USED.

4.   STARTING PROCEDURE

4.1   STARTING ADDRESS

      0200

4.2   CONTROL SWITCH SETTINGS

      SR00=1, SUPPRESS HALT ON ERROR
      SR03=1, SUPPRESS END OF PASS TYPEOUT
      SR09=1, HOLD DATA 1 CONSTANT
      SR10=1, HOLD DATA 2 CONSTANT
      SR11=1, HOLD INSTRUCTION CONSTANT

4.3   OPERATOR ACTION

4.3.1 SET SR TO 0200

4.3.2 PRESS LOAD ADDRESS SWITCH

4.3.3 SET SR TO 0000

4.3.4 PRESS CLEAR AND CONTINUE SWITCHES
      ----

5.   OPERATING PROCEDURE

      SAME AS 4.

6.   ERRORS

6.1   ERROR HALT

      IF THE RESULTS OF THE TAD INSTRUCTION ARE INCORRECT,
      THAT IS IF THE ACTUAL AND SIMULATED LINKS, OR THE ACTUAL
      AND SIMULATED SUMS DO NOT AGREE, THE PROGRAM
      WILL HALT AT 7409 WITH DATA1 IN THE AC.

      DEPRESS CONTINUE TO DISPLAY DATA2 IN THE AC.
      DEPRESS CONTINUE TO DISPLAY TAD INSTRUCTION IN AC.
      DEPRESS CONTINUE TO DISPLAY INSTRUCTION ADDRESS IN AC.
      DEPRESS CONTINUE TO DISPLAY DATA2 ADDRESS IN AC.
      DEPRESS CONTINUE TO DISPLAY INDIRECT POINTER (USED BY INDIRECT
      TAD) IN AC.
      DEPRESS CONTINUE TO RESUME TEST.

6.2   ERROR RECOVERY

      SEE 6.1

6.3   LOOPING

       SET SR00=1 TO PREVENT HALT AFTER ERROR.

       SET SR03=1 TO SUPPRESS END OF PASS TYPEOUT;

       SET SR09-SR11=1 TO HOLD INSTRUCTION AND DATA CONSTANT.

7.   RESTRICTIONS

       NONE

8.   EXECUTION TIME

       THE PROGRAM PERFORMS 4096 RANDOM TESTS IN APPROXIMATELY 5
       SECONDS. THE PROGRAM WILL TYPE "T" AFTER
       EACH 4096 RANDOM TESTS UNLESS SR03=1.

9.   PROGRAM DESCRIPTION

       THE PROGRAM IS LOADED INTO LOCATIONS 6000-7577,
       WITH TEMPORARY STORAGE LOCATIONS ON PAGE 0;

       THE PROGRAM USES SEPARATE RANDOM NUMBER GENERATORS TO GENERATE
       THE TAD INSTRUCTION, INSTRUCTION AND DATA ADDRESSES, AND THE
       TWO ARGUMENTS TO BE "TADDED". THE INSTRUCTIONS AND DATA ARE
       STORED IN THEIR PREVIOUSLY GENERATED ADDRESSES. THE PROGRAM
       TRANSFERS TO THE LOCATION OF THE INSTRUCTION AND EXECUTES IT;
       THE PROGRAM THEN TRANSFERS TO A COMPARISON ROUTINE WHERE THE
       ACTUAL RESULT OF THE TAD INSTRUCTION IS COMPARED TO A SIMULATED
       TAD. THE SIMULATOR IS SIMILAR TO THE ONE USED IN MAINDEC-
       8E-D0CA-D. NO TADS ARE USED IN THE PROGRAM ITSELF.

       AFTER 4096 TESTS, THE PROGRAM TYPES "T" AND CONTINUES TESTING.

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                       /
                       /RANDOM TAD TEST
                       /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                       /V 02 87552
                       /
                       /
                       /TEMPORARY STORAGE LOCATIONS
                       /
       0000   0000   *0
0000   0000   0000   RETURN, 0
0001   5001   5001   INSTL, JMP
0002   0002   0002   INADDL, 2
0003   0003   0003   DATADL, 3
0004   0000   0000   PADDL, 0
0005   0000   0000   IFLAGL, 0

       7501   MQA=7501
       7421   MQL=7421
       6007   CAF=6007

       0200   *200
0200   6007   START, CAF
0201   5602   JMP I   .+1
0202   6600   STARTL

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                       /
                       /GENERATE TEST INSTRUCTION AND DATA
                       /
       6600   *6600
6600   7300   STARTL, CLA CLL
6601   3376   DCA   CNTR1   /CLEAR PASS COUNTER
6602   7604   TEST1L, LAS
6603   0371   AND   SR11   /TEST SR11
6604   7640   SZA CLA   /IS SR11=1
6605   5224   JMP   TDAT1L   /SR11=1, DO NOT GENERATE INSTRUCTION
6606   4746   JMS I   TGENL   /GENERATE INSTRUCTION
6607   3355   DCA   TIFLGL   /SAVE INDIRECT FLA
6610   7040   CMA
6611   0001   AND   INSTL   /GET INSTRUCTION
6612   3353   DCA   TINSTL   /SAVE IT
6613   7040   CMA
6614   0002   AND   INADDL   /GET INSTRUCTION ADDRESS
6615   3354   DCA   TINADL   /SAVE IT
6616   7040   CMA
6617   0003   AND   DATADL   /GET DATA ADDRESS
6620   3356   DCA   TDATAL   /SAVE IT
6621   7040   CMA
6622   0004   AND   PADDL   /GET INDIRECT TO DATA
6623   3357   DCA   TPADDL   /SAVE IT
6624   7604   TDAT1L, LAS
6625   0372   AND   SR10   /TEST SR10

```
                        6626  7640            SZA CLA                    /IS SR10=1
                        6627  5234            JMP     TDAT2L             /SR10=1, DO NOT GENERATE DATA1
                        6630  7040            CMA
                        6631  0360            AND     TDA1L              /GENERATE RANDOM NUMBER
                        6632  4752            JMS I   TRANDL
                        6633  3360            DCA     TDA1L
                        6634  7604    TDAT2L, LAS
                        6635  0373            AND     SR09               /TEST SR09
                        6636  7640            SZA CLA                    /IS SR09=1
                        6637  5244            JMP     SETTL              /SR09=1, DO NOT GENERATE DATA2
                        6640  7040            CMA
                        6641  0361            AND     TDA2L              /GENERATE RANDOM NUMBER
                        6642  4752            JMS I   TRANDL
                        6643  3361            DCA     TDA2L

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                                /
                                /SET UP INSTRUCTION AND DATA AT TEST ADDRESS
                                /ALONG WITH RETURN TO THIS ROUTINE
                                /
                        6644  7340    SETTL,  CLA CLL CMA
                        6645  0353            AND     TINSTL             /GET INSTRUCTION
                        6646  3754            DCA I   TINADL             /STORE IN TEST LOCATION
                        6647  7040            CMA
                        6650  0355            AND     TIFLGL             /GET INDIRECT FLAG
                        6651  7650            SNA CLA                    /IS INSTRUCTION INDIRECT
                        6652  5302            JMP     DIRL               /NO, GET DATA
                        6653  7040            CMA
                        6654  0356            AND     TDATAL             /ADDRESS IS INDIRECT
                        6655  0367            AND     T7760              /IS ADDRESS AUTO-INDEX REGISTER
                        6656  7640            SZA CLA
                        6657  5276            JMP     NOTAUT             /NO
                        6660  7040            CMA
                        6661  0356            AND     TDATAL
                        6662  0375            AND     K10
                        6663  7650            SNA CLA
                        6664  5276            JMP     NOTAUT
                        6665  7040            CMA
                        6666  0357            AND     TPADDL             /ADDRESS IS AUTO-INDEX REGISTER
                        6667  7041            CIA                        /DECREMENT POINTER TO DATA
                        6670  7040            CMA
                        6671  3756            DCA I   TDATAL             /STORE IN TEST LOCATION
                        6672  7040            CMA
                        6673  0360            AND     TDA1L              /GET DATA
                        6674  3757            DCA I   TPADDL             /STORE IN TEST LOCATION
                        6675  5305            JMP     DOTSTL
                        6676  7040    NOTAUT, CMA
                        6677  0357            AND     TPADDL
                        6700  3756            DCA I   TDATAL
                        6701  5272            JMP     .-7
                        6702  7040    DIRL,   CMA
                        6703  0360            AND     TDA1L              /GET DATA
                        6704  3756            DCA I   TDATAL             /STORE IN TEST LOCATION
                                /
                                /SIMULATE "TAD"
                                /
                        6705  7340    DOTSTL, CLA CLL CMA


                        6706  0360            AND     TDA1L              /GET DATA1
                       .6707  7421            MQL                        /SAVE IN MQ
                        6710  7040            CMA
                        6711  0361            AND     TDA2L              /GET DATA2
                        6712  4751            JMS I   TSIMAD             /DO SIMULATION
                        6713  3363            DCA     TSIMAC             /SAVE ANSWER
                        6714  7010            RAR
                        6715  3362            DCA     TSIML              /SAVE LINK

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                                /
                                /GO TO TEST
                                /
                        6716  7040    DGANDL, CMA
                        6717  0347            AND     TRETTL             /GET RETURN ADDRESS
                        6720  3000            DCA     RETURN             /SAVE
                        6721  7040            CMA
                        6722  0394            AND     TINADL             /GET INSTRUCTION ADDRESS
                        6723  7001            IAC                        /INCREMENT
                        6724  7450            SNA                        /IS IT 0
                        6725  5202            JMP     TEST1L             /YES, GENERATE NEW INFORMATION
                        6726  3345            DCA     TEMP2L             /NO, SAVE
                        6727  7040            CMA
                        6730  0366            AND     TS400L             /GET RETURN INSTRUCTION
                        6731  3745            DCA I   TEMP2L             /PUT IN TEST LOCATION
                        6732  7140            CLL CMA
                        6733  0361            AND     TDA2L              /GET DATA2
                        6734  5754            JMP I   TINADL             /EXECUTE "TAD"
                                /
                                /RETURN HERE AFTER EXECUTION
                                /
                        6735  3364    TRETUL, DCA     TAC                /SAVE AC
                        6736  7010            RAR
                        6737  3365            DCA     TLINK              /SAVE LINK
                        6740  4774            JMS I   TCOMAD             /COMPARE REAL AND SIMULATED ADDITIONS
                        6741  2376            ISZ     CNTR1
                        6742  5202            JMP     TEST1L
                        6743  4750            JMS I   TEPASL             /END OF PASS, 4806 TEST COMPLETE
                        6744  5202            JMP     TEST1L

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                                /
                                /
                        6745  0000    TEMP2L, 0
                        6746  7000    TGENL,  GENL
                        6747  6735    TRETTL, TRETUL
                                     TERROR,
                        6750  7442   .TEPASL, EPASL
                        6751  7200    TSIMAD, RSIMAD
                        6752  7430    TRANDL, RANDL
                        6753  0000    TINSTL, 0
                        6754  0000    TINADL, 0
                        6755  0000    TIFLGL, 0
                        6756  0000    TDATAL, 0
                        6757  0000    TPADDL, 0
```

```
6 42   2221    TDA1L,  21
6 61   2237    TDA2L,  37
6762   2222    TSIML,  2
6763   2222    TSIMAC, 2
6764   2222    TAC,    2
6765   2222    TLINK,  2
6766   5422    T5400L, 5400
6767   7 60    T7760,  7760
6770   7 70    T7770,  7770
6771   0221    SR11,   1
6772   0222    SR10,   2
6773   0224    SR09,   4
6774   7313    TCOMAD, COMAD
6775   0212    K10,    10
6776   0222    CNTR1,  0
```

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```
               /
               /GENERATE INSTRUCTIONS AND ADDRESSES
               /
       7222    PAGE
7000   2222    GENL,   0
               /
               /GENERATE "AND" INSTRUCTION
               /
7001   7242    GANDL,  CMA
7002   0350            AND     R1L
7003   4762            JMS I   SRANDL          /GENERATE RANDOM NUMBER
7004   3350            DCA     R1L             /SAVE NUMBER
7005   7242            CMA
7006   0350            AND     R1L
7007   7421            MQL                     /GENERATE OP CODE
7010   7242            CMA
7011   0365            AND     K1222
7012   7521            MQA
7013   0352            AND     K1777
7014   3221            DCA     INSTL           /SAVE INSTRUCTION
7015   7242            CMA
7016   0221            AND     INSTL           /GET INSTRUCTION
7017   0355            AND     K2177L          /EXTRACT PAGE ADDRESS OF INSTRUCTION
7020   3361            DCA     TEMP3L          /SAVE PAGE ADDRESS OF INSTRUCTION
               /
               /GENERATE ADDRESS FOR INSTRUCTION
               /
7021   7242    GANADL, CMA
7022   0353            AND     R2L
7023   4762            JMS I   SRANDL          /GENERATE RANDOM NUMBER
7024   3353            DCA     R2L             /SAVE NUMBER
7025   7242            CMA
7026   0353            AND     R2L
7027   4777'           JMS     LIMIT           /IS ADDRESS WITHIN LIMITS
7030   5221            JMP     GANADL          /NO, GENERATE NEW ADDRESS
7031   7242            CMA
7032   0353            AND     R2L
7033   0354            AND     P2L
7034   7642            SZA CLA                 /IS ADDRESS ON PAGE 2
7035   5244            JMP     PAGADL          /NO
7036   7242            CMA
```

```
7037   0353            AND     R2L             /GET PAGE ADDRESS OF INSTRUCTION
7040   4776'   PAGAL,  JMS     ABSL            /GET DIFFERENCE BETWEEN PAGE ADDRESSES
7041   7722            SNA CLA                 /IS DIFFERENCE >2
7042   5221            JMP     GANADL          /NO
7043   5255            JMP     PAL
```

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```
7044   7242    PAGADL, CMA
7045   0221            AND     INSTL           /GET INSTRUCTION
7046   0357            AND     K222L
7047   7652            SNA CLA                 /IS PAGE BIT SET
7050   5255            JMP     PAL             /NO, USE ADDRESS AS IS
7051   7242            CMA
7052   0353            AND     R2L             /PAGE BIT SET, EXTRACT PAGE ADDRESS FOR INSTRUCTION
7053   0355            AND     K2177L
7054   5240            JMP     PAGAL           /TEST FOR INTERFERENCE
7055   7242    PAL,    CMA
7056   0361            AND     TEMP3L          /MAKE SURE DATA WILL
7057   7652            SNA CLA                 /NOT BE STORED IN LOCATION 2
7060   5201            JMP     GANDL           /LOCATION ZERO, TRY AGAIN
7061   7242            CMA                     /USE ADDRESS AS IS
7062   0353            AND     R2L
7063   3222            DCA     INADDL
```

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```
               /
               /GENERATE ADDRESS FOR DATA
               /
7064   7242    DAADL,  CMA
7065   0221            AND     INSTL           /GET INSTRUCTION
7066   0357            AND     K222L           /IS PAGE BIT OF INSTRUCTION SET
7067   7652            SNA CLA
7070   5307            JMP     P2AL            /NO, USE PAGE ADDRESS BITS OF INSTRUCTION FOR DATA ADDRESS
7071   7242            CMA
7072   0222            AND     INADDL          /EXTRACT PAGE OF INSTRUCTION ADDRESS
7073   0354            AND     P2L
7074   7421            MQL
7075   7242            CMA
7076   0361            AND     TEMP3L
7077   7521            MQA                     /"OR" TOGETHER TO SET
7100   3223            DCA     DATADL          /DATA ADDRESS
7101   7242    INDIRL, CMA
7102   0221            AND     INSTL
7103   0356            AND     K422L
7104   7642            SZA CLA                 /IS INSTRUCTION INDIRECT
7105   5313            JMP     PADL            /YES, INSTRUCTION IS INDIRECT
7106   5622            JMP I   GENL            /EXIT
7107   7242    P2AL,   CMA                     /USE PAGE ADDRESS OF INSTRUCTION
7110   0361            AND     TEMP3L          /AS DTAT ADDRESS
7111   3223            DCA     DATADL
7112   5321            JMP     INDIRL
               /
               /GENERATE INDIRECT ADDRESS FOR DATA
               /
```

```
        7113  7042    PADL,   CMA
        7114  0360            AND     R3L             /GENERATE RANDOM NUMBER
        7115  4762            JMS I   SRANDL
        7116  3360            DCA     R3L
        7117  7040            CMA
        7120  0360            AND     R3L
        7121  4771'           JMS     LIMIT           /IS ADDRESS WITHIN LIMITS
        7122  5313            JMP     PADL            /NO, TRY AGAIN
        7123  7040            CMA
        7124  0002            AND     INADDL          /GET INSTRUCTION ADDRESS
        7125  4751'           JMS     ABSL1           /GENEREATE DIFFERENCE BETWEEN ADDRESSES
        7126  7700            SMA CLA                 /DO INSTRUCTION AND ADDRESS INTERFERE
        7127  5313            JMP     PADL            /YES
        7130  7040            CMA                     /NO, TEST DATA ADDRESS AS ABOVE
        7131  0003            AND     DATADL
        7132  4751'           JMS     ABSL1
        7133  7700            SMA CLA
        7134  5313            JMP     PADL
        7135  7040            CMA
        7136  0360            AND     R3L             /ADDRESSES DO NOT INTERFERE
        7137  7041            CIA                     /WILL LOCATION BE 0 IF DECREMENTED
        7140  7040            CMA
        7141  7650            SNA CLA
```

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```
        7142  5313            JMP     PADL            /YES, GENERATE NEW POINTER
        7143  7040            CMA
        7144  0360            AND     R3L
        7145  3004            DCA     PADDL
        7146  7040            CMA
        7147  5600            JMP I   GENL            /EXIT
                             /
                             /
                             /
        7150  0001    R1L,    1
        7151  0003    K3L,    3
        7152  1777    K1777,  1777
        7153  0005    R2L,    5
        7154  7600    P0L,    7600
        7155  0177    K0177L, 177
        7156  0400    K400L,  400
        7157  0200    K200L,  200
        7160  0015    R3L,    15
        7161  0000    TEMPSL, 0
        7162  7430    SRANDL, RANDL
        7163  7200    BRIMAD, RSIMAD
        7164  1201    LIML,   1201
        7165  1000    K1000,  1000
```

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```
                             /
                             /
                             /SIMULATED ADDITION
                             /
        7175  7507

        7176  7474
        7177  7303
        7200            PAGE
        7200  0000    RSIMAD, 0
        7201  3344            DCA     ARG2            /SAVE ARGUMENTS
        7202  7501            MQA
        7203  3343            DCA     ARG1
                             /
                             /
                             /SIMULATE ADDITION BY SIMULATED GENERATEION OF SUM
                             /AND CARRY BITS
                             /
                             /
                             /FORM OR OF ARG1 WITH ARG2
                             /
        7204  7340    SIMAD,  CLA CLL CMA
        7205  0343            AND     ARG1            /LOAD AC WITH ARG1
        7206  7421            MQL                     /PLACE IN MQ
        7207  7040            CMA
        7210  0344            AND     ARG2            /LOAD AC WITH ARG2
        7211  7501            MQA                     /FORM ARG1 OR ARG2
        7212  3345            DCA     A1ORA2          /SAVE ARG1 OR ARG2
                             /
                             /FORM XOR(EXCLUSIVE OR) OF ARG1 WITH ARG2
                             /BY A XOR B=(A AND NOTB)OR(NOTA AND B)
                             /
        7213  7501            MQA                     /GET ARG1 FROM MQ
        7214  7040            CMA                     /FORM NOTARG1
        7215  0344            AND     ARG2            /AND WITH ARG2 TO GET ARG2 AND NOTARG1
        7216  7421            MQL                     /SAVE IN MQ
        7217  7040            CMA
        7220  0344            AND     ARG2            /LOAD AC WITH ARG2
        7221  7040            CMA                     /FORM NOTARG2
        7222  0343            AND     ARG1            /AND WITH ARG1 TO GET ARG1 AND NOTARG2
        7223  7501            MQA                     /OR WITH ARG2 AND NOTARG1
        7224  3346            DCA     SIMAC           /TO GET ARG1 XOR ARG2
        7225  3347            DCA     SIMLNK
```

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```
                             /
                             /AND ARG1 WITH ARG2
                             /TEST FOR CARRIES
                             /IF THERE ARE NO BITS IN COMMON BETWEEN ARG1 AND ARG2
                             /THERE WILL BE NO CARRIES GENERATED
                             /
        7226  7040            CMA
        7227  0343            AND     ARG1            /LOAD AC WITH ARG1
        7230  0344            AND     ARG2            /AND WITH ARG2
        7231  7450            SNA                     /ARE THERE ANY CARRIES
        7232  5274            JMP     ENDSIM          /NO, TERMINATE SIMULATION
                             /
                             /GENERATE CARRIES
        7233  7421            MQL                     /SAVE FIRST CARRIES
        7234  7521    NXTCAR, MQA MQL                 /GET CARRIES FROM MQ
        7235  0345            AND     A1ORA2          /AND WITH A1ORA2 TO SEE IF MORE CAPRIES ARE GENERATED
        7236  7450            SNA                     /ARE THERE ANY MORE CARRIES
```

```
7237  5244            JMP     ENCAR       /NO, END SIMULATION OF CARRIES
7240  7104            CLL RAL             /PROPIGATE CARRIES
7241  7521            MQA MQL             /GET PREVIOUS CARRIES FROM MQ, SAVE NEW CARRIES
7242  7501            MQA                 /OR NEW CARRIES WITH PREVIOUS CARRIES
7243  5234            JMP     NXTCAR      /CONTINUE
                      /
                      /TEST FOR CARRY INTO LINK
7244  7501   ENCAR,   MQA                 /GET CARRIES
7245  0345            AND     A1ORA2      /AND WITH A1ORA2
7246  0350            AND     K4000       /TEST BIT 00
7247  7450            SNA                 /IS BIT 00 1
7250  5253            JMP     ENCAR1      /NO, CARRIES DID NOT PROPIGATE INTO LINK
7251  3347            DCA     SIMLNK      /YES, SAVE CARRY INTO LINK
7252  5260            JMP     XORALL      /COMPLETE SIMULATION
7253  7130   ENCAR1,  CLL CML RAR         /SET AC=4000
7254  0343            AND     ARG1        /AND WITH ARG1
7255  0344            AND     ARG2        /AND WITH ARG2 TO SEE IF ORIGINAL
7256  7440            SZA                 /NUMBERS GENERATED CARRY INTO LINK
7257  3347            DCA     SIMLNK      /SAVE SIMULATED LINK

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                      /
                      /FORM XOR OF ARG1, ARG2, AND CARRIES
                      /TO GET FINAL SIMULATED SUM
                      /
7260  7501   XORALL,  MQA                 /SAVE SIMULATED CARRIES
7261  3351            DCA     CARRY
7262  7501            MQA
7263  7040            CMA
7264  0346            AND     SIMAC       /FORM A1ORA2 AND NOTCARRY
7265  7421            MQL                 /SAVE IN MQ
7266  7040            CMA
7267  0346            AND     SIMAC
7270  7040            CMA
7271  0351            AND     CARRY       /FORM CARRY AND NOTA1ORA2
7272  7501            MQA                 /OR WITH CONTENTS OF MQ
7273  3346            DCA     SIMAC
7274  7340   ENDSIM,  CLA CLL CMA
7275  0347            AND     SIMLNK
7276  7640            SZA CLA
7277  7020            CML
7300  7040            CMA
7301  0346            AND     SIMAC
7302  5600            JMP I   RSIMAD      /TO GET FINAL SIMULATED SUM
                      /
                      /TEST ADDRESS
                      /
7303  0000   LIMIT,   0
7304  7421            MQL                 /SAVE ARGUMENT IN MQ
7305  7040            CMA
7306  0777'           AND     LIML        /LOAD AC WITH LIMIT
7307  4200            JMS     RSIMAD      /DO ADDITION
7310  7620            SNL CLA             /LINK SET IF NUMBER TO LARGE
7311  2303            ISZ     LIMIT       /NUMBER OK
7312  5703            JMP I   LIMIT


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                      /
                      /COMPARE SIMULATED AND REAL RESULT
                      /
7313  0000   COMAD,   0
7314  7340            CLA CLL CMA
7315  0776'           AND     TSIML       /GET SIMULATED RESULTANT LINK
7316  7640            SZA CLA
7317  7020            CML
7320  7040            CMA
7321  0775'           AND     TLINK       /COMPARE TO REAL LINK
7322  7640            SZA CLA
7323  7020            CML
7324  7430            SZL                 /IF SAME, LINK=0
7325  5341            JMP     ERROR1      /NOT THE SAME, ERROR
7326  7340            CLA CLL CMA
7327  0774'           AND     TAC         /GET ADDITION RESULT
7330  7040            CMA
7331  0773'           AND     TSIMAC      /COMPARE TO COMPLEMENT OF SIMULATION RESULT
7332  7440            SZA
7333  5341            JMP     ERROR1      /NOT 0, ERROR
7334  7040            CMA
7335  0773'           AND     TSIMAC      /GET SIMULATION RESULT
7336  7040            CMA
7337  0774'           AND     TAC         /COMPARE TO COMPLEMENT OF REAL ADDITION
7340  7640            SZA CLA
7341  4752   ERROR1,  JMS I   ERRORS
7342  5713            JMP I   COMAD
7343  0000   ARG1,    0
7344  0000   ARG2,    0
7345  0000   A1ORA2,  0
7346  0000   SIMAC,   0
7347  0000   SIMLNK,  0
7350  4000   K4000,   4000
7351  0000   CARRY,   0
7352  7400   ERRORS,  ERROR

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                      /
                      /ERROR HANDLER
                      /
7373  6763
7374  6764
7375  6765
7376  6762
7377  7104
      7400   PAGE
7400  0000   ERROR,   0
7401  7604            LAS
7402  0267            AND     SR00        /TEST SR00
7403  7650            SZA CLA             /IS SR00=1
7404  5600            JMP I   ERROR       /YES, DO NOT HALT
7405  7240            CLA CMA
```

```
7406  0777'         AND     TDA1L       /HALT WITH DATA1 IN AC
7407  7402          HLT
7410  7240          CLA CMA
7411  0776'         AND     TDA2L       /HALT WITH DATA2 IN AC
7412  7402          HLT
7413  7240          CLA CMA
7414  0775'         AND     TINSTL      /HALT WITH INSTRUCTION IN AC
7415  7402          HLT
7416  7240          CLA CMA
7417  0774'         AND     TINADL      /HALT WITH INSTRUCTION ADDRESS IN AC
7420  7402          HLT
7421  7240          CLA CMA
7422  0773'         AND     TDATAL      /HALT WITH DATA ADDRESS IN AC
7423  7402          HLT
7424  7240          CLA CMA
7425  0772'         AND     TPADDL      /HALT WITH INDIRECT IN AC
7426  7402          HLT
7427  5600          JMP I   ERROR
                    /
                    /RANDOM NUMBER GENERATOR
                    /
7430  0000  RANDL,  0
7431  7104          CLL RAL
7432  7420          SNL
7433  5240          JMP     ENRAN
7434  7421          MQL
7435  7040          CMA
7436  0241          AND     K3
7437  4771'         JMS     RSIMAD
7440  5630  ENRAN,  JMP I   RANDL
7441  0003  K3,     3
```

```
                    /
                    /END OF PASS
                    /
7442  0000  EPASL,  0
7443  7604          LAS
7444  0270          AND     SR03
7445  7640          SZA CLA
7446  5642          JMP I   EPASL
7447  7040          CMA
7450  0271          AND     C215
7451  4261          JMS     TYPE
7452  7040          CMA
7453  0272          AND     C212
7454  4261          JMS     TYPE
7455  7040          CMA
7456  0273          AND     C324
7457  4261          JMS     TYPE
7460  5642          JMP I   EPASL
                    /
                    /
                    /
7461  0000  TYPE,   0
7462  6046          TLS
7463  6041          TSF
7464  5263          JMP     .-1
7465  7200          CLA
7466  5661          JMP I   TYPE
                    /
                    /
7467  4000  SR00,   4000
7470  0400  SR03,   0400
7471  0215  C215,   215
7472  0212  C212,   212
7473  0324  C324,   324
                    /
                    /TEST FOR PROPER DIFFERENCE
                    /
7474  0000  ABSL,   0
7475  7041          CIA
7476  7421          MQL
7477  7040          CMA
7500  0770'         AND     TEMP3L
7501  4771'         JMS     RSIMAD
7502  7500          SMA
7503  7041          CIA
7504  7001          IAC
7505  7001          IAC
7506  5674          JMP I   ABSL
```

```
                    /
                    /
                    /
7507  0000  ABSL1,  0
7510  7041          CIA
7511  7421          MQL
7512  7040          CMA
7513  0767'         AND     R3L
7514  4771'         JMS     RSIMAD
7515  7500          SMA
7516  7041          CIA
7517  7001          IAC
7520  7001          IAC
7521  5707          JMP I   ABSL1
                    S
7567  7160
7570  7161
7571  7200
7572  6757
7573  6756
7574  6754
7575  6753
7576  6761
7577  6760
```

```
0000   11111100  00000002  00000000  00000000  00000000  00000000  00000000  00000000
0100   00000000  00000002  00000000  00000000  00000000  00000000  00000000  00000000

0200   11100000  00000020  00000000  00000000  00000200  00000000  00000000  00000000
0300   00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

0400
0500

0600
0700

1000
1100

1200
1300

1400
1500

1600
1700

2000
2100

2200
2300

2400
2500

2600
2700

3000
3100

3200
3300

3400
3500

3600
3700
```

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```
4000
4100

4200
4300


4400
4500

4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

6000
6100

6200
6300

6400
6500

6600   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

7000   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100   11111111  11111111  11111111  11111111  11111111  11111111  11111100  00000111

7200   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300   11111111  11111111  11111111  11111111  11111111  11100000  00000000  00011111

7400   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500   11111111  11111111  11000000  00000000  00000000  00000000  00000001  11111111

7600
7700
```

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Symbol	Value	Symbol	Value
A1ORA2	7345	PAGAL	7040
ABSL	7474	PAL	7095
ABSL1	7507	R1L	7150
ARG1	7343	R2L	7153
ARG2	7344	R3L	7160
C212	7472	RANDL	7430
C215	7471	RETURN	0000
C324	7473	RSIMAD	7200
CAF	6007	SETTL	6644
CARRY	7351	SIMAC	7346
CNTR1	6776	SIMAD	7204
COMAD	7313	SIMLNK	7347
DAADL	7064	SR00	7467

```
DATADL  0003        SR03    7470
DIRL    6702        SR09    6773
DOANDL  6716        SR10    6772
DOTSTL  6705        SR11    6771
ENCAR   7244        SRANDL  7162
ENCAR1  7253        SRIMAD  7163
ENDSIM  7274        START   0200
ENRAN   7440        STARTL  6600
EPASL   7442        T5400L  6766
ERROR   7400        T7760   6767
ERROR1  7341        T7770   6770
ERRORS  7352        TAC     6764
GANADL  7021        TCOMAD  6774
GANDL   7001        TDA1L   6760
GENL    7000        TDA2L   6761
IFLAGL  0005        TDAT1L  6624
INADDL  0002        TDAT2L  6634
INDIRL  7101        TDATAL  6756
INSTL   0001        TEMP2L  6745
K0177L  7155        TEMP3L  7161
K10     6775        TEPASL  6750
K1000   7165        TERROR  6750
K1777   7152        TEST1L  6602
K200L   7157        TGENL   6746
K3      7441        TIFLGL  6755
K3L     7151        TINADL  6754
K4000   7350        TINSTL  6753
K400L   7156        TLINK   6765
LIMIT   7303        TPADDL  6757
LIML    7164        TRANDL  6752
MQA     7501        TRETTL  6747
MQL     7421        TRETUL  6735
NOTAUT  6676        TSIMAC  6763
NXTCAR  7234        TSIMAD  6751
P0AL    7107        TSIML   6762
P0L     7154        TYPE    7461
PADDL   0004        XORALL  7260
PADL    7113
PAGADL  7044
```
```
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```

ERRORS DETECTED: 0

LINKS GENERATED: 23

RUN-TIME: 5 SECONDS

2K CORE USED